

REMARKS

Applicants have now had an opportunity to carefully consider the Examiner's comments set forth in the Office Action of June 19, 2003.

All of the Examiner's objections and rejections are traversed.

Reexamination and reconsideration of claims 1-8 and 10-22, as set forth herein, is respectfully requested.

The Office Action

In the Office Action of June 19, 2003:

Claims 8, 14, 15, 18, and 19 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Nishikawa (4,943,735);

Claims 1-3 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Mosher et al. (5,512,978);

Claims 5-6 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Mosher et al. (5,512,978) in view of Fujita et al. (4,273,843);

Claim 7 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Mosher et al. (5,512,978) in view of Ito et al. (5,342,722);

Claim 10 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Nishikawa (4,943,735) in view of Mosher et al. (5,512,978);

Claims 12-13 and 16-17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nishikawa (4,943,735) in view of Fujita et al. (4,273,843); and

Claims 4, 9, and 11 are indicated as containing allowable subject matter.

GENERAL COMMENTS ON THE CITED REFERENCES

Nishikawa determines toner concentration using a transmission measurement employing a single photodetector 19. This measurement does not provide spectral information but rather only information at a single wavelength of light, and therefore cannot measure a color characteristic. The transmission measurement uses the light sensor 19 (see FIG 3 and col. 3 lines 23-42) to determine transmission data such as is shown in FIGs 4A and 4B. The developer 12 being measured is a liquid developer (col. 3 lines 23-24) that forms a thin film in openings 16 to permit transmission measurements.

Fujita et al. determines toner concentration using a reflection measurement employing a single light receiving element 3c. This measurement also does not provide spectral information, and hence cannot measure a color characteristic. The transmission measurement uses the light sensor 3c coupled with filter 3d to select the monitored wavelength (see FIG 3 and col. 4 lines 1-24) to determine reflection data. FIGs 5 and 6 plot reflectance for unused and used developer, showing that the reflectance changes with use; however, there is no suggestion of measuring a spectral range of data to measure of toner concentration; rather, as specified in Fujita claim 1, a single pre-selected wavelength is selected to maximize the intensity of reflected light in response to variations in toner concentration.

Mosher et al. determines components of a two-component liquid developer (col. 6 lines 42-58) using a transmission measurement employing an Fourier transform infrared (FTIR) apparatus to acquire an infrared spectrum. (col. 7 lines 1-40). The concentrations are computed based on infrared absorbances. (col. 7 lines 50-65).

CLAIM 1 HAS BEEN AMENDED TO MORE CLEARLY DISTINGUISH OVER THE REFERENCES OF RECORD

Claim 1 calls for a spectrophotometer that measures spectrophotometric data for the portion of the developer in the developer sample container. A spectrophotometer is "an instrument that measures transmission or apparent reflectance of visible light as a function of wavelength, permitting accurate analysis of color or accurate comparison of luminous intensities of two sources or specific wavelengths." MCGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS, 4th ed., Sybil P. Parker, ed. (McGraw-Hill, 1989).

In contrast, Mosher et al. discloses a Fourier transform infrared (FTIR) apparatus that does not measure visible light, but rather measures infrared light that does not contribute to the visible color of the sampled developer. Thus, the FTIR of Mosher et al. cannot be considered to be a spectrophotometer. Nishikawa and Fujita et al. measure the developer at a single wavelength, and thus cannot be read as disclosing or suggesting a spectrophotometer for measuring toner concentration.

Claim 1 has been amended to further distinguish over the references of record by specifying that the processor estimates the toner concentration based on

a pre-determined relationship between at least one color space coordinate obtained from the spectrophotometric data and the toner concentration. Color space coordinates can include, but are not limited to: color space coordinates (L^* , a^* , b^*); L^* and hue and chroma values; or CMC color difference parameters.

In contrast, Mosher et al. perform a computationally intense matrix inversion employing the full absorbance spectrum without aggregation, as described at col. 7 lines 41-65, where the matrix A is the matrix of absorbances. The approach of the present application optionally takes advantage of existing commercial spectrophotometers that typically output color space coordinates directly, eliminating the need for application-specific programming for extracting toner concentration data from raw absorbance spectra as taught by Mosher et al.

Claim 2 is amended to specify a surfactant. The references of record, including Mosher et al., do not disclose or fairly suggest a surfactant that is mixed with the portion of developer extracted from the developer housing.

Claim 3 has been amended to call for the pre-determined relationship to include a pre-determined empirical relationship between toner concentration and the at least one color space coordinate. Mosher et al. does not provide any relationship, much less an empirical relationship, between toner concentration and at least one color space coordinate, because Mosher et al. does not mention color space coordinates or an equivalent thereof.

Claim 7 calls for a leveling device for leveling the surface of the developer sample. The Office Action cites Ito et al. respective to claim 7 as "teach[ing] tapping the toner for dispersion (col. 12, lines 10-30)." Applicants respectfully submit this cited passage is not relevant to claim 7. Dispersion of the toner material in a solvent is considered to be unrelated to leveling, and moreover tapping is an action, not a "leveling device".

Claim 20 calls for one of the processor and the spectrophotometer to compute color space coordinates including the at least one color space coordinate from the spectrophotometric data. This claim further distinguishes over Mosher et al., because in Mosher et al. the absorbance data is directly used in the form of the matrix A, without computing color space coordinates.

Claim 21 calls for a spectrophotometer employing a reflection geometry. Of the applied references, only Fujita et al. employ a reflection geometry. However,

Fujita et al. measures data at a single wavelength, whereas a spectrophotometer measures at a plurality of wavelengths to provide information on sample color. Moreover, as noted previously, none of the cited references disclose or fairly suggest a spectrophotometer.

For at least these reasons, Applicants request allowance of claims 1-3, 5-7, 20, and 21.

CLAIM 4, WHICH WAS INDICATED AS CONTAINING ALLOWABLE SUBJECT MATTER, HAS BEEN PLACED INTO INDEPENDENT FORM

Claim 4, which was indicated as containing allowable subject matter, has been placed into independent form. Accordingly, Applicants urge allowance of independent claim 4.

CLAIM 8 HAS BEEN AMENDED TO INCORPORATE ALLOWABLE SUBJECT MATTER OF CLAIM 9

Claim 8 has been amended to incorporate allowable subject matter of canceled claim 9. Applicants therefore respectfully submit that claim 8 is now in condition for allowance.

Claim 14 calls for leveling the developer sample. Nishikawa col. 6 lines 10-30 is cited by the Office Action in rejecting claim 14. That passage of Nishikawa describes opening outlet opening 61 to introduce a liquid developer into vessel 56 until a liquid level is stabilized. There is no leveling involved; rather, the liquid developer inherently has a level surface, and the position of that level surface moves upward as the liquid developer is introduced into vessel 56. That is, Nishikawa merely refers to filling the vessel 56 up to a selected volume or level.

For at least these reasons, Applicants request allowance of claims 8 and 10-14.

CLAIM 15 HAS BEEN AMENDED TO INCORPORATE ALLOWABLE SUBJECT MATTER OF CLAIM 11

Claim 15 has been amended to incorporate allowable subject matter of claim 11. Applicants therefore respectfully submit that claim 15 is now in condition for allowance.

Claim 19 as amended calls for leveling a surface of the sample of the developer in the sample container. Nishikawa col. 6 lines 10-30 cited by the Office Action in rejecting claim 19 describes opening outlet opening 61 to introduce a liquid developer into vessel 56 until a liquid level is stabilized. There is no disclosure or fair suggestion of leveling a surface of the sample in Nishikawa. Indeed, because the developer is a liquid developer, the surface is inherently level.

For at least these reasons, Applicants request allowance of claims 15-19.

**NEW CLAIM 22 INCORPORATES ALLOWABLE SUBJECT MATTER OF
CANCELED CLAIM 9**

New claim 22 incorporate allowable subject matter of canceled claim 9. Applicants therefore respectfully submit that claim 22 is in condition for allowance.


CONCLUSION

For the reasons detailed above, it is respectfully submitted all claims 1-8 and 10-22, as set forth herein, are now in condition for allowance. The foregoing comments do not require unnecessary additional search or examination.

In the event the Examiner considers personal contact advantageous to the disposition of this case, he is hereby authorized to call Mark Svat, at Telephone Number (216) 861-5582.

Respectfully submitted,

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